



Code No. : 6389/N

**FACULTY OF ENGINEERING**  
**B.E. 4/4 (M/P) I Semester (New) (Suppl.) Examination, June / July 2010**  
**OPERATIONS RESEARCH**

Time: 3 Hours]

[Max. Marks: 75

*Note : 1) Answer all questions from Part – A.*

*2) Answer any Five questions from Part – B.*

PART – A (Marks : 25)

(10×2.5=25)

1. Give any four examples of management problems solved through operations research.
2. What are the major assumptions in a LP model ?
3. Define Travelling salesman problem.
4. What are the reasons for replacement analysis ?
5. What are the characteristics of Game theory ?
6. What is sensitivity analysis ?
7. Briefly explain Kendall's notation used in queuing models.
8. Discuss the principle of Dominance in Game.
9. Write a short note on group replacement policy.
10. Differentiate between sequencing and scheduling .

PART – B

(5×10=50)

11. Solve the following LP model using simplex method.

10

Maximize  $Z = 9x + 10y$

Subject to :  $11x + 9y \leq 9900$

$7x + 12y \leq 8400$

$6x + 16y \leq 9600 \quad x, y \geq 0$

(This paper contains 3 pages)



12. a) What is degeneracy in Transportation problem ? (3)

b) ABC company has three ware houses X, Y and Z of capacity 500, 600 and 400 respectively, and 4 stores P, Q, R and S of requirements 200, 700, 500 and 100 respectively. Cost matrix is given in the following table 1. Find the minimum transportation cost using VAM. (7)

Warehouse /Store	P	Q	R	S
X	5	15	7	6
Y	8	7	9	1
Z	2	9	8	8

Table 1

13. Use dual simplex method to solve the LPP. (10)

$$\text{Minimize } Z = x_1 + 2x_2 + 3x_3$$

$$\text{Subject to : } x_1 - x_2 + x_3 \geq 4$$

$$x_1 + x_2 + 2x_3 \leq 8$$

$$x_2 - x_3 \geq 2$$

$$x_1, x_2, x_3 \geq 0$$

14. Find the minimum assignment cost for the following model. (10)

Machines / Worker	I	II	III	IV	V
A	6	5	8	11	16
B	1	13	16	1	10
C	16	11	8	8	8
D	9	14	12	10	16
E	10	13	11	8	16



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15. A scooter mechanic has an average of 4 customers per an hour. The average service time is 6min. Arrival follows poisson distribution and service follows exponential distribution. Determine.
- i) Proportion of time shop is empty ii) Average time spend in system iii) Expected number of customers in the system iv) Expected number of customers in the queue (v) Average waiting time in the queue. (10)
16. a) Explain Johnson's Algorithm for n jobs & 2 machines. (4)
- b) Determine the total elapsed time for the following 6 jobs and 3 machines problem. (6)

Job	Processing Time (hrs.)		
	M/C A	M/C B	M/C C
1	8	5	4
2	10	6	9
3	6	2	8
4	7	3	6
5	11	4	5
6	9	4	7

17. Solve the following game of two players A & B using dominance principle.

Player B

Player A

	B1	B2	B3	B4
A1	6	-10	9	0
A2	6	7	8	1
A3	8	7	15	1
A4	3	4	-1	4